FEATURE ARTICLE

NEXTEL "E-SMRS"

New Generation Land Mobile Service Could Give Cellular More Than A Little Competition.

by George DuBois

It's claimed that Cellular Radiotelephone service now covers 90% of the population of the United States. In each city, there are two cellular service providers, right? Yes and no. There are now new "cellular" systems popping up all over the country. Right next to the towers for AirTouch and AT&T Wireless, there just might be a third tower. No, we're not talking about the new Personal Communications Service. That's probably still months away. There are 900 MHz Narrowband PCS systems going on the air right now, but that's essentially just fancy paging.

No, we're talking about the 800 MHz Specialized Mobile Radio Service (SMRS). Not the twenty-channel trunked systems, with their hilltop repeater sites that provide two-way radio service to plumbers and furnace repair companies. We're talking about the new "Enhanced" SMRS systems that look and sound (and cost) pretty much the same as a cellular sys tem!

Is This Really New?

For years, the FCC's rules have allowed most (but not all) Business Band repeaters to be used for "autopatch" landline telephone calls, technically called "interconnection." These are phone calls placed on regular two-way land mobile channels. This is only allowed on a secondary, not-for-profit basis. It is especially popular in the 800 MHz band. Trunked systems allow a higher grade of service than is possible at 460 MHz, where a single call will tie up the channel "for the duration." The secondary status was eased by the FCC and autopatch was well-liked by business users, especially since they already owned the two-way radios. Of course, many radio dealers were not above selling the radios to small businesses as "de facto mobile phones." Many times, a business would own only a single mobile unit, so you know they only had it for the autopatch service!

The FCC prohibited radio system owners from making a profit on autopatch calls, since to do otherwise would make them common carriers and, after all, this is (or was) a Private Land Mobile service. System owners got around this by charging for "air time" instead, sometimes up to fifty cents a minute—more than what cellular costs now!

Over the last few years things have started to change. A number of companies petitioned the FCC to waive their rules to allow them to construct wide-area systems that allowed their customers to travel from one area to another and still use their radios. Then companies started asking for waivers for more "exotic" systems—systems that would use their assigned frequencies at multiple transmitter sites with lower power, all very similar to the cellular telephone concept! The term that began to be used to describe these systems was E-SMRS, or "Enhanced Specialized Mobile Radio Service." And they began to be very popular.

A year or so ago the FCC finally proposed to change their rules to allow the construction of these types of systems without having to apply for waivers. Many of their regulations worked against these new operators—such as limits on the number of frequencies that could be held in an area, the types of emission, the location of additional transmitter sites and the time limit within which a system must be placed on the air or the license forfeited.

That proposal has fallen by the wayside as the FCC has adopted new rules that reallocate the entire 861 to 866 MHz portion of the 851 to 866 MHz band for new wide-area, wideband SMRS systems. (See the FCC News column in last months issue.) You can bet that E-SMRS service is going to catch on in a big way now, completely changing the 800 MHz landscape. One company, Nextel Communications, Inc., appears poised to dominate the market, although they are not alone in this game.

A Little History

When the Specialized Mobile Radio Service was first created, the FCC's rules prohibited the manufacturers of two-way radio equipment from owning more than three trunked 800 MHz systems anywhere in the country. They figured that if they didn't do this, Motorola, GE, et al, would take over the whole band. This was changed in the mid-80's since, by then, they figured that there were enough systems on the air that no manufacturer would be in a position to gain dominance of the marketplace. In fact, it worked out great. Motorola was the only company that came close to constructing a nationwide system, putting in systems wherever they could find vacant channels. (These were usually in the 856 to 861 MHz segment, the last group of trunked channels to be made available.) Their dealers, and independent radio shops, could then put users on Motorola's systems. After all, the real money anymore is in sales, and this allowed small dealers to be able to sell trunked SMRS service to their customers without the huge expense involved in putting up their own 800

MHz trunked systems.

At first, it was figured that Motorola was eventually going to develop a network of interconnected SMRS systems but, with the implementation of new Mobile Satellite Services, nationwide cellular service and so forth, it just wouldn't be profitable for them. So Motorola decided to get out of the SMRS business and sold their entire "quasi-network" of trunked repeaters. (They stated at the time that they wanted to concentrate on making radio equipment, but they have since gotten into the Mobile-Satellite business!) Motorola found ready buyers for their system in companies like OneComm, Inc. In 1994, Motorola petitioned the FCC to assign almost all of their licenses to OneComm.

OneComm is a Denver, Colorado-based corporation, founded in 1989 as CenCall Communications Corporation. In May of 1994, the company changed its name formally to OneComm Corporation. Over the years they acquired 800 MHz Specialized Mobile Radio Service systems by applying for available frequencies and, in many cases, purchasing systems from other license holders. These systems were mainly in the Western states.

OneComm's services included mobile telephone, alpha-numeric paging, and two-way radio service. OneComm had also implemented an advanced digital system using the Motorola Integrated Radio System (MIRS) technology in the Colorado Front Range and the Interstate-5 corridor from Seattle, Washington to Portland, Oregon. (The system is still being expanded slowly south.) MIRS uses time-division multiplexing, allowing six, individual communications to take place on the same channel.

Then, in August of 1994, OneComm was bought out, becoming a wholly-owned subsidiary of Nextel Communications. In February of 1995, OneComm requested that the FCC transfer all of their licenses to Nextel.

Like OneComm, Nextel intends to implement a nationwide, seamless, all-digital network capable, they claim, "of providing services similar to existing cellular and future PCS offerings." Nextel is a publicly traded U.S. corporation—at that time based in Rutherford, New Jersey—which owns numerous subsidiaries that hold SMR licenses throughout the United States. To complete their nationwide system, they entered into several agreements to acquire 800 MHz regional SMR licenses, one of which was the deal with OneComm. Another was the August, 1994 deal to acquire Dial Page, which held 800 MHz licenses in twelve Southwestern states.

In December of 1994, Motorola asked the FCC for their OK to transfer their 800 MHz SMR licenses to Nextel, or more specifically, nine of Nextel's subsidiaries. These included Nextel Western Acquisition Corp., Smart SMR of California, Smart SMR of New York, Dispatch Communications of New England, Dispatch Communications of Mid-Atlantic, Inc., Smart SMR of Illinois, Smart SMR of Texas, Inc., and Powerfone, Inc.

After initiating the OneComm purchase, Nextel entered into an agreement with Motorola involving the transfer of Motorola's SMR licenses to Nextel in exchange for approximately 24% of Nextel's voting stock. In addition, Nextel agreed to use Motorola's MIRS technology in its wide-area digital network.

There was opposition to both of these transfers (the transfer from Motorola to OneComm and the later transfer of control of OneComm to Nextel). Opponents argued that it would decrease the number of competitors and increase prices. They claimed that it would allow Nextel to monopolize all of the available SMRS frequencies. Equipment manufacturers thought that the agreement with Motorola would exclude other radio manufacturers from the wide-area SMRS market (even though Motorola supposedly makes their MIRS technology available to other manufacturers). Supporters noted that it would increase competition with cellular and PCS providers.

The OneComm & Nextel merger was approved for a number of reasons, but mainly that the anti-competitive argument didn't hold water when you considered that Nextel held very few licenses in the same cities as OneComm. Their merger wouldn't give them an inordinate number of channels in any one area, at least not any more than one or the other already

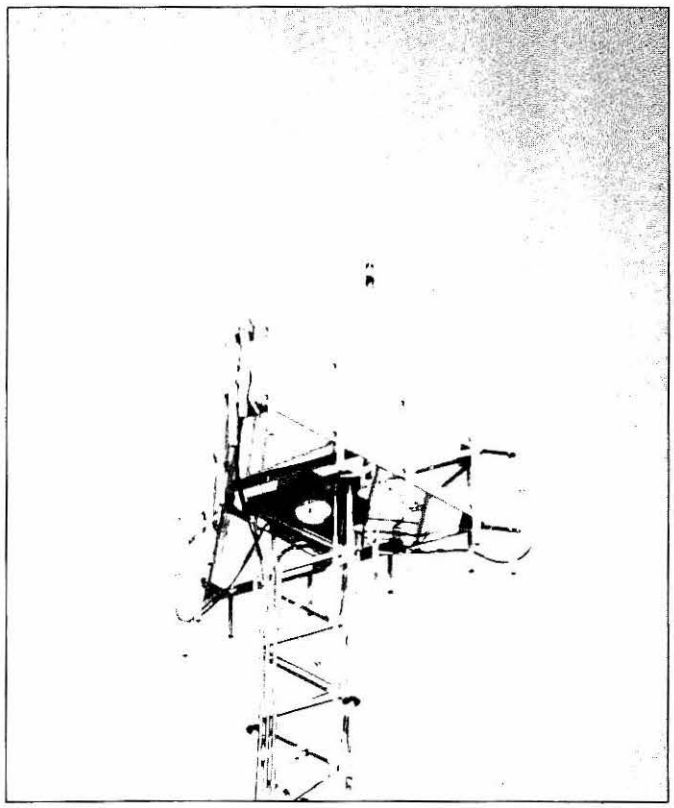

Photo by G. DuBois

A close-up of a Nextel "E-SMRS" tower. As you can see, the antennas are configured for omni-directional use, but have the mounting hardware in place to install directional antennas if or when the number of users on the system requires "sectoring" of their sites. This effectively turns a site into three sites, since a group of frequencies is used in each sector, for use by mobile units in that sector. This is similar to the configuration of cellular mobile telephone systems.

held. The FCC also didn't want to consider the competitiveness of the SMRS market on its own. They looked at the Commercial Mobile Radio Service (CMRS) market as a whole, and decided that the merger would result in a system that would be competitive with other CMRS services, such as Cellular, PCS, etc., not just with other SMRS providers. In April of last year, the FCC approved that assignment of over 1500 licenses held by Motorola to Nextel.

That's not the end of the story. Last year the McCaw family, flush from the sale of the Cellular One system to AT&T Wireless for $11.5 billion, decided to invest $1.1 billion in Nextel over the next six years. (Late last year, Nextel announced that they were moving their corporate headquarters to the Seattle, Washington area. McCaw's headquarters are in the Seattle suburb of Bellevue. They only recently changed their minds again. They now intend to move their headquarters to the Washington, D.C. area.)

After the completion of the McCaw deal, McCaw now owns 22.7 percent of Nextel, Motorola, 15.8% and Comcast Corp, 14.1%. Matsushita, a Japanese equipment manufacturer, holds a 1.38% interest and the right to designate one member of Nextel's nine-person Board of Directors. Nippon Telephone and Telegraph holds a .7% interest and a Board position. (Because of these foreign investors, Nextel had to apply for a waiver of the FCC's foreign-ownership restrictions.) Nextel does indeed appear poised to dominate the new ESMR market.

The Landscape Today

At the time of their sale to Nextel, OneComm held licenses in Arizona, Colorado, Idaho, Illinois, Indiana, Iowa, Kansas, Kentucky, Minnesota, Missouri, Nebraska, Ohio, Oklahoma, Oregon, Pennsylvania, South Dakota, Texas, Utah, Washington, Wisconsin and Wyoming. These are in addition to the licenses Nextel acquired from other, smaller companies in other areas of the country.

If you look in the FCC database for the state of Oregon (USSN's home), licenses on literally every other frequency in the 800 MHz band belong to OneComm (now Nextel). These were trunked systems in the upper five MHz that had been in service for years, and single conventional (non-trunked) channels in the 851 MHz area. Four thousand channels alone, in Idaho, Washington and Oregon, are unused, but were allowed by the FCC to be transferred to Nextel because of the waiver process that allows this, for frequencies that will eventually become part of a wide-area system. (Usually, you can't transfer the license for a system that is not on the air. This is to prevent speculation in licenses and frequency "warehousing.")

What has Nextel done with all of these channels? Many of them have continued to operate as five-, ten- and twenty-channel trunked systems. Many are still sitting vacant! A number of them have been converted to their new MIRS ESMR service, supposedly providing a level of service equivalent to cellular service. And, physically, they look very much like a cellular system!

You may have an ESMR system operating in your area right now and not even know it, especially if you never search the trunked Business and SMRS channels. I'll be the first to admit that there's not much to listen to. The Motorola MIRS system sounds just like static, as if you were to open your squelch control on a vacant channel. But tracking down the systems is a heck of a lot of fun, if you enjoy that type of thing.

What To Look For?

This is hard to say. Initially, an E-SMRS licensee will use a system that is already on the air, especially if it was one they purchased from another SMR. This will likely be a typical analog voice system, with the transmitter located on the nearest hill along with all the rest of the local repeaters. Searching through the 800 MHz band these days, with all the digital-type signals being transmitted by companies like RAM, ARDIS and so forth, you probably won't spot them.

The tip-off would be that their transmissions sound just like static, as we said. Search at night, when normal, two-way radio traffic is at a minimum. The MIRS signals transmit continuously. A scanner with a very narrow bandwidth will sometime scan right past one of these signals. In fact, with most radios, the signal might be received better when you are off frequency to either side of the center frequency. Signal strength peaks at the center frequency but the relatively wide deviation causes some radios to mute or attempt to tune to either side of the actual frequency. Search in 12.5 kHz steps from 851.0125 to 865.9875 MHz. If you know your radio has a sharp bandwidth, try searching in 5 kHz steps, although this will take forever.

As an E-SMRS system develops, more sites are added, usually lower-power, low-elevation sites which serve a much smaller geographic area and allow the same frequencies to be used again at other sites. Outside of urban areas, their sites will probably be at higher elevations, since they can serve a much larger area and aren't needed for capacity. Within urban areas, of course, it's a different story. The system must be able to provide a much higher call capacity. That's why they look very much like cellular systems and will be designed that way from day one. And like our cover picture shows, they will probably be located right next door to them, too!

If you should happen upon a "suspect" site, search as described earlier, but disconnect your antenna. This will cut out other, interfering signals, plus confirm that this is indeed the transmitter (or that it's very close).

The accompanying map shows details of the system operating in USSN's hometown; Portland, Oregon. Each site originally had two conventional 25 kHz-wide channels. Using the Motorola MIRS technology, each carrier is capable of carrying six conversations. One of these "channels" is a control signal, leaving 11 channels available for voice conversations. Recently, a third channel has been added at some sites, allowing up to 17 conversations. All of the sites are currently omni-directional, but ready for easy conversion to directional sectors, to increase capacity.

When the system first began operation they got a little press in the business section of the local papers. Since then, they have all but disappeared. Their service is only offered through commercial two-way radio dealers (specifically, the largest local Motorola radio dealer).

Apparently, they figure that this is where there market is.

The service costs about $70 a month. For this, you get their "Unicator," a combined two-way radio, mobile telephone and pager. You also get 120 minutes of telephone (autopatch) time and 500 minutes of regular dispatch (two-way) communications time. Time after that runs about a quarter a minute.

This may not seem like such a great deal compared to your local cellular provider. Their retailers (you know, drug stores and tire shops) offer a free phone and maybe a half an hour of phone service a month for around thirty bucks. But for the small business owner thinking of investing in a two-way radio system, this may be just the ticket. Even with the competition from imported commercial rigs over the last decade or so, a good quality two-way radio with any decent features will still run you anywhere from five hundred to a thousand bucks and up–*each*! If Nextel can outfit your three or four delivery trucks for a couple hundred dollars a month, including what you would otherwise pay for repeater use charges on other systems, plus give you mobile telephone capability, it doesn't look too bad to a small business owner.

What Does The Future Hold?

Obviously, this is only speculation. But with the new changes to the rules and the opportunity to have up to 3 MHz of 800 MHz spectrum to yourself, a number of companies appear poised to take off and run with the new Enhanced SMRS technology. An early potential investor in the OneComm system (MCI) backed out when they realized that the service was just two-way radio service with autopatch and that the quality of service wouldn't be quite on a par with cellular. It's clear that it's much more than that now, with added transmitter sites now offering service quality equivalent to cellular service. There were some early questions about the MIRS system and whether, in fact, it even worked reliably. Part of the problem appears to be that the signal has to be confined to a 25 kHz-wide channel under the current rules. Under the new rules, a whole block of frequencies will belong to a licensee, to configure as he sees fit. The technical problems will likely be overcome easily.

Of course, almost any type of technology is likely to be used in these new ESMR systems, not just MIRS. The new FCC rules don't specify any technical standards other than those required to prevent interference. In fact, there's no reason why a new E-SMRS licensee couldn't use conventional analog FM on regular 25 kHz-spaced channels from low power, low elevation sites, exactly like current cellular systems!

What is Nextel going to do with all those licenses they are holding, scattered throughout the 800 MHz band? Well, since the amended FCC rules require the new E-SMRS licensees to find homes for the systems currently operating in the new 861 to 866 MHz frequency blocks that they acquire in the auction, it seems highly likely that Nextel will offer to relocate these systems to all these frequencies that they're sitting on. Whether they turn a profit or not (or how soon) depends on how much they have to pay for their licenses in the upcoming auctions. Some have said that SMRS licenses couldn't be auctioned, since there isn't enough profit to be made if they have to pay a hefty fee to get a license. There's also the fact that a "license" for one of the new E-SMRS channel blocks at 861 MHz is really only a shot at a license! You can't start operating until you relocate the existing users. It's really a crapshoot! How much would you pay for such a "license"?

The recent auctions for the 935 to 940 MHz SMRS channels did net a few bucks, though, and these weren't nearly as attractive as the new 861 MHz channel blocks. (The 935 MHz channels are not heavily used outside the ten largest cities in the country, but in those cities, existing systems must be accommodated.)

It appears that the companies that planned ahead are in a position to make a real killing in the "new" ESMR band at 861 to 866 MHz. Others, including existing licensees (and the users of their systems), may not be so lucky. **USSN**

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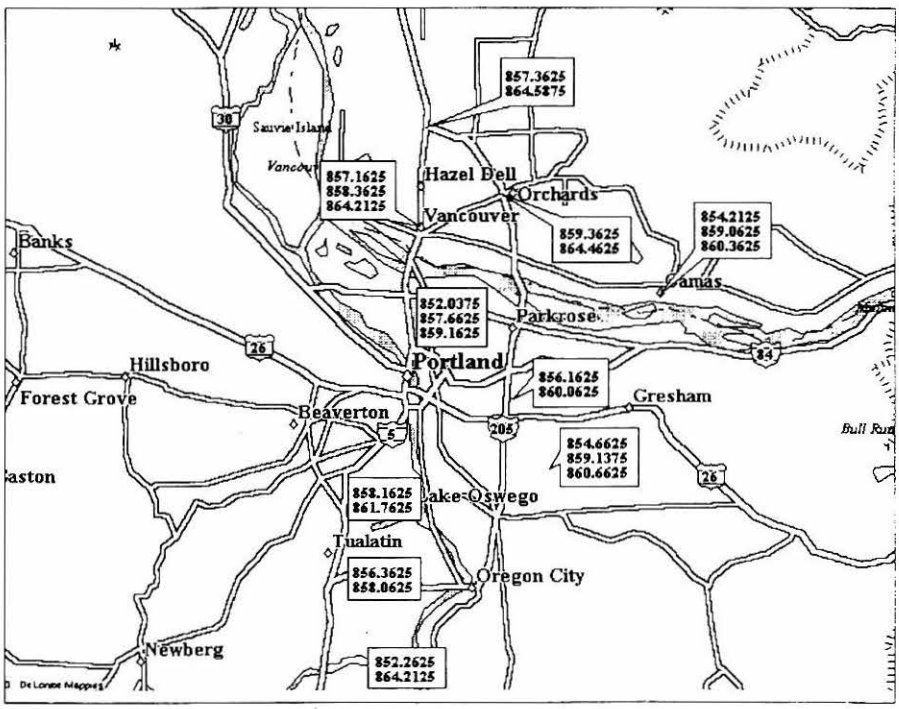

Map showing the transmitter locations and frequencies of Nextel's local "Enhanced"-SMRS service. Notice the almost "cellular-like" configuration, complete with frequency reuse. (Numerous additional sites to the south and west re-use many of the same frequencies shown in this map.) Also note that many of the frequencies are from the same five-channel trunk groups, 856 through 860.1625 and 856 through 860.3625, for example.

All of this will change, of course, if Nextel successfully bids for the new region-wide channel blocks in the 861 to 866 MHz band.

Similar Systems

Over the years there have been a number of other companies which have sought waivers to build what were once considered "exotic" systems.

Ram Mobile Data was probably the first. (You've read about Ram in our FCC News column.) In the late 80's, they were granted a number of waivers of the FCC's rules governing 900 MHz land mobile systems to allow them to construct a nationwide digital data two-way radio system in the 935 to 940 MHz band. In some cities, they contracted with the owners of existing licensees, incorporating them into their system that now offers local, regionwide or nationwide data service. Their system is on the air in most cities, transmitting digital data only. They transmit what appears to be the same data on each channel in a system, each channel at a different location. (As you tune from channel to channel, you can see the difference in signal strength.) The individual systems in each city are interconnected via a landline, packet-switched telephone network. Ram added 150 sites to their system last year and is planning to add 350 more this year. This should give them coverage of 94 percent of the urban markets, they claim. (Personally, this author sees the new Narrowband PCS service at 900 MHz, now coming on line, as giving Ram's system a run for their money.)

Another now-infamous proceeding was the Fleet Call waiver, a predecessor to Nextel. This was the 1991 waiver order that more or less established the procedure under which future waivers for wide-area systems would be granted, and opened the floodgates for every other company that wanted their "slice of the pie" in the wide-area SMRS game. In the Order, the FCC declined to grant Fleet Call most of the exemptions they requested, such as the use of TDMA digital emissions, extra protection from co-channel interference, stating that most of their requests could be accommodated under the FCC's existing rules. The one request that they did grant was the one for extension of the time period during which a licensee was required to place their system on the air or lose their license, normally one year for a trunked system. Fleet Call was given a five-year construction deadline, which has allowed them to hold on to their channels, used or not, for all this time.

Most recently, there were a couple of applicants for more advanced SMRS systems. CELSMeR is a general partnership that manages and operates specialized mobile radio systems in Florida. Last year they asked for a waiver of the FCC's mobile unit loading requirements for 900 MHz SMR systems until 30 days after completion of the auction for the Tampa-St. Petersburg-Orlando, Florida market. They stated that they are developing a wide-area 900 MHz SMR system and had entered into management agreements with the licensees of ten separate 10-channel trunked SMR stations to create a wide-area "seamless" radio network. Their intention is to implement digital technology at each of the SMRS sites in the system, which "will provide for more efficient use of the spectrum and greatly increase the system's capacity."

As they also pointed out, the waiver would enable it to compete against other advanced wide-area 900 MHz SMR systems that already have loading and construction waivers, such as PowerSpectrum. Inc. and Advanced Radio Communications Service of Florida, Inc.

They were granted a waiver until the auctions for the 935 to 940 MHz SMRS channels were completed, on the condition that they would have to meet the mobile unit loading requirements in those areas where they did not acquire channels in the auction. (Channels acquired in the auction are granted exclusively to a licensee. It's not likely that someone is going to pay big bucks for a license in the auction and then let the channels sit idle, so the FCC doesn't impose any channel loading requirements on these systems. They do have system construction deadlines, though). In other words, if CELSMeR didn't get the licenses they bid for in the auction, they will have to start using the channels they were granted, loading them to capacity, or they will lose them!

In another action, the request of Viking Dispatch Services in New Jersey to acquire more than the initial limit of twenty channels per market and to use channels allocated to the Business and Industrial & Land Transportation pools in the 935 to 940 Mhz band was denied. Viking wanted to construct trunked SMRS systems in 91 cities. These systems would be used by entities eligible in the Business and Industrial radio services and would be operated on a non-profit, cost-sharing basis. The systems would not have autopatch capability and therefore would be classified as Private Land Mobile Radio systems, as opposed to a Commercial Mobile Radio Service.

Opposition came from other users, who pointed out that a waiver would allow Viking to pretty much grab up all of the unused channels in the Business and Industrial pools. (There are three pools at 935 MHz—Business, Industrial & Land Transportation and SMRS.) They also pointed out that Viking didn't have a single potential customer lined up, making it kind of hard for them to justify their request.

The clincher, however, came when it was claimed that Viking was affiliated with E.F. Johnson Company, a manufacturer of two-way radios and that this was just a plan to gain an equipment monopoly. (The name "Viking," a Johnson-brand radio from years ago, should have been a tip-off!) Viking admitted that Johnson analog and digital radios would be used in the systems.

The FCC decided that "the record in this case does not support granting Viking's waiver requests."

USSN

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